

## ABSTRACT OF THE DISCLOSURE

FIBER-OPTIC APPARATUS AND METHOD FOR MAKING SIMULTANEOUS  
MULTIPLE PARAMETER MEASUREMENTS

A fiber-optic method for making simultaneous multiple parameter measurements employs an optical fiber sensor having at least one long period grating disposed therein. An excitation is created in the optical fiber sensor wherein a plurality of evanescent field sensing depths result. At least two long period grating signatures are created. When the optical fiber sensor is exposed to at least one material, changes in the material are identified by simultaneously measuring and comparing shifts in each long period grating signature; correlating the shifts to changes in the material; and solving a series of equations that compare changes in the coupling wavelength for a specific loss band. A reactive coating may be applied to the optical fiber sensor proximate to the long period grating such that changes in the reactive coating as it reacts with the material may also be monitored.